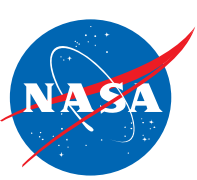


NASA Life Sciences Data Repositories: Tools for Retrospective Analysis and Future Planning

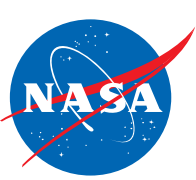
D. Thomas¹, M. Wear³, M. Van Baalen,² L.Lee,³ , M. Fitts²

¹Lockheed Martin, ²NASA Johnson Space Center (JSC), ³Wyle




Data Repository Goals

- Enable combination of medical and research data where applicable to reduce astronaut spaceflight health and performance risks
 - Support operational and health care analyses
 - Support NASA research objectives
- Improve dissemination of and access to NASA life sciences data and information



Providing Data and Information to the Research and Operations Communities




[HOME](#) | [RESEARCH PROJECTS](#) | [MEDICAL OPERATIONS](#) | [DATA REQUESTS](#) | [JUST FOR FUN](#) | [e-BOOKS](#)

Human Research Program Data @ Johnson Space Center, Houston, Texas [Search](#)

NASA Human Research Program (HRP)

NASA's Human Research Program (HRP) conducts research and develops technologies that allow humans to travel safely and productively in space. The Program uses evidence from data collected on astronauts, as well as other supporting studies. These data are stored in two NASA data repositories: Life Sciences Data Archive (LSDA) and Lifetime Surveillance of Astronaut Health (LSAH).




More about HRP: [HRP Home](#) | [Human Research Roadmap](#) | [Evidence Book](#) | [Progress Reports](#)

[About Life Sciences Data Archive \(LSDA\)](#)

[Lifetime Surveillance of Astronaut Health \(LSAH\)](#)

[Search Publicly Available Information and Data](#) [RSS](#)


Data Accessibility



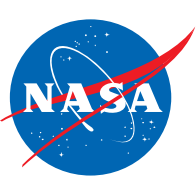
View this video presentation regarding the current status of Data Accessibility. In this presentation, Dr. Clarence Sams discusses the content of the Human Life Science Data, the data archive structure, the applicable legal documents and policies, and the methods for data access.

Missions in Progress

Expedition 26



Life Sciences Data Archive URL: <http://lsda.jsc.nasa.gov>



Online Searchable Catalog: Current Research Projects

[Current Research Projects](#) [Completed Research Projects](#) [NASA Research Opportunities](#)

CURRENT RESEARCH

Current Research Projects

- + [Exercise Countermeasure Project \(ECP\)](#)
- + [Flight Analogs Project \(FAP\)](#)
- + [International Space Station \(ISS\)](#)
- + [Lifetime Surveillance of Astronaut Health \(LSAH\)](#)
- + [NASA Extreme Environment Mission Operations \(NEEMO\) Project](#)
- + [Non-exercise Physiological Countermeasure \(NExPCM\) Project](#)
- + [Shuttle Ongoing Research](#)

Search Publicly Available Information and Data [RSS](#)

Experiment

Mission

Personnel

Photo Gallery

Biospecimens

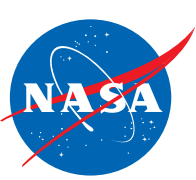
Documents

Hardware

Dataset

Archived non-attributable data can be downloaded directly from the public website

| INFORMATION ABOUT THIS DATA | |
|--|--|
| Data Set Name | Resting Gas Exchange in ISS Crewmembers |
| Data Set Description | <p>Pulmonary function tests were performed on eight crewmembers (7 male, 1 female) of the International Space Station who performed a total of 15 extravehicular activities (EVAs) and who followed denitrogenation procedures approved for EVA from the International Space Station. Of those EVAs, nine were performed using the Russian Orlan suits and six were performed using the US Extravehicular Mobility Unit (EMU).</p> <p>Source: Prisk GK, Fine JM, Cooper TK, and West JB. Pulmonary gas exchange is not impaired 24 h after extravehicular activity. <i>J Appl Physiol</i> 2005;99:2233-2238.</p> |
| Level of Processing | Analyzed - Microsoft Excel Spreadsheet |
| Data Files [Available online] | + 96_E044_1950418134.xls File size : 35 kb Download |
| Measurements | <div>Alveolar dead space (VDAIv)</div> <div>Alveolar ventilation (VA)</div> <div>Average inspiratory flow rate (VT/TI)</div> <div>Breathing frequency (fB)</div> <div>Cabin pressure</div> <div>Carbon dioxide production (VCO2)</div> |



Online Searchable Catalog: Completed Research Projects

A significant addition to the archive content is the Detailed Supplemental Objectives data

Current Research Projects **Completed Research Projects** **NASA Research Opportunities**

COMPLETED RESEARCH

Historical Research Projects

- + Apollo Program
- + Apollo-Soyuz Test Project (ASTP)
- + Artificial Gravity (Fractional Gravity)
- + Bion Cosmos Flight Research
- + Biosatellite Program
- + Biospecimen Sharing Program (BSP)
- + Countermeasures Evaluation & Validation Project (CEVP)
- + Gemini Program
- + Lunar-Mars Life Support Test Project (LMLSTP)
- + IIASA Ground-Based Investigations
- + IIASA-Mir Program
- + Project Mercury
- + Shuttle Detailed Supplementary Objectives (DSO)
- + Shuttle Extended Duration Orbiter Medical Project (EDOMP)
- + Shuttle Life Sciences Research (Middeck)
- + Shuttle Life Sciences Research (Spacelab)
- + Shuttle Student Involvement Program (SSIP)
- + Skylab Program

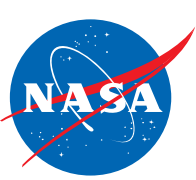
HISTORICAL RESEARCH

Shuttle Detailed Supplementary Objectives (DSO)

Conducted aboard the Space Shuttle, Detailed Supplementary Objectives (DSO) were medical investigations supplementary to the primary Shuttle payload performed voluntarily by the crewmembers. DSOs flown on Shuttle missions were designed to require minimal crew time, power and stowage. DSOs focused on studying adaptation to microgravity (specifically space motion sickness) as well as cardiovascular deconditioning, muscle loss, changes in coordination and balance strategies, radiation exposure, pharmacokinetics and changes in the body's biochemistry.

Related Experiments

| |
|--|
| + Acceleration Detection Sensitivity (DSO 405) |
| + Adaptation to Linear Acceleration After Space Flight (DSO 207) |
| + Air Monitoring and Atmosphere Characterization (DSO 611) |
| + Ambulatory Monitoring (DSO 416) |
| + Anatomical Observation (DSO 422) |
| + Animal Enclosure Module In-flight Test (DSO 421) |
| + Assessment of Circadian Shifting in Astronauts by Bright Light (DSO 484) |
| + Assessment of Human Factors (DSO 904) |



Research Publications: Electronic Books

Links are provided to related websites

CURRENT NASA PROJECTS:



Human Research Program (HRP)

[Human Research Roadmap](#)
[Evidence Book](#)
[Science Progress Reports](#)
[SPACELINE Current Awareness List](#)
selected recent publications of interest in

Lifetime Surveillance of Astronaut Health (LSAH)

The Lifetime Surveillance of Astronaut Health (LSAH) program for occupational surveillance program for and monitor astronauts for occupational health. The LSAH-R was established to implement a research component to enable analysis of astronaut medical data.
[View LSAH Newsletters](#)

Medical Operations

The [Medical Requirements Integration Document \(MRID Book\)](#) defines integration activities to support the medical requirements (MR) for both short-duration and long-duration human space flight for the Space Shuttle/International Space Station (ISS) programs. Or [View Individual Medical Requirements](#)
Recent publications: See ASTP and Skylab in Completed NASA Projects .

NIASA Technical Reports Server

Since it was first released in 1994, the [NTRS](#) serves as a valuable resource for students, educators, researchers, and the public for access to NASA's current and historical technical literature.

COMPLETED NASA PROJECTS:



Project Mercury

[Space Medicine in Project Mercury](#)

Gemini Program

[Gemini Mid-Program Conference](#)

Apollo Program

[Biomedical Results of Apollo](#)

Apollo-Soyuz Test Project

[Medical Report](#)

Skylab Program

[Biomedical Results of Skylab](#)
Recent publications: [The Skylab Medical Operations Project: Recommendations to Improve Crew Health and Performance for Future Exploration Missions](#)

Shuttle Program

[The Neurolab Spacelab Mission: Neuroscience Research in Space](#)
[Extended Duration Orbiter Medical Project - Final Report](#)

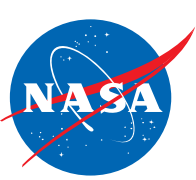
Lunar Mars Life Support Test Project (LMLSTP)

[Isolation: NASA Experiments in Closed-Environment Living](#)
[+ Whole book](#)
[+ Each chapter](#)

Fundamental Biology Animal and Plant Research

[Life Into Space, Volumes 1, 2 and 3 - Fundamental Biology](#)

Research program
publications can be read
online or downloaded



Animal Research Data: Biospecimen Sharing Program

- Animal biospecimens include organisms that have flown in space and subjects of related ground control studies
 - Available samples are surplus (unassigned) biospecimens
- Applicants may submit proposals specifically for analysis of materials obtained from this program or as a supplementary component of an experiment proposal in another research area

Search

Search within Results

Search: Using: All Words [+ GO](#) [+ Help](#)

Category
(Any Category)

Payload/Mission Participation
(Any payload/mission)

Species Studied
(Any species)

Session/Type
(Any)

Reset [+ GO](#)

The search term
“Muscular” returns the
following result:

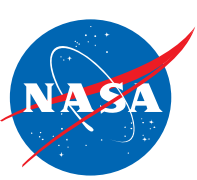
Biospecimen Search Results

- You searched Category: Biospecimen Name= "Muscular"

Biospecimen Unassigned: Found 163 Biospecimen Assigned: Found 890

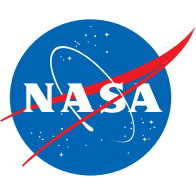
These tissues are available for research. [+ Tissue Requests](#)

| Name | ID | Species | Collection Phase | Session Type |
|-------------------|------|---------|------------------|----------------|
| + Adductor longus | 4822 | Rat | Postflight | Flight |
| + Adductor longus | 4823 | Rat | Preflight | Basal |
| + Adductor longus | 4824 | Rat | Postflight | Flight control |
| + Adductor longus | 4825 | Rat | Postflight | Ground control |



Clinical Data: Lifetime Surveillance of Astronaut Health

- The Longitudinal Study of Astronaut Health was closed out and control subjects were released in May 2010.
- The new LSAH program will continue to examine the incidence of acute & chronic morbidity and mortality of astronauts, and define the risks of morbidity and mortality associated with the occupational exposures encountered by astronauts.
- All astronauts selected into the US space program will be monitored throughout their NASA career and retirement from the astronaut corps.
- The major goals of the new program are:
 - Develop and Provide a Comprehensive Annual Medical Exam for each LSAH Participant
 - Conduct Occupational Surveillance
 - Improve Communication, Data Accessibility, Integrity and Storage
 - Support Operational and Health Care Analyses
 - Support NASA Research Objectives



Clinical Data: Medical Tests Performed

Medical Operations

The Space Medicine Division mission is to optimize the health, fitness, and well being of flight crews.

Astronaut medical data are collected per requirements detailed in the [+ Medical Requirements Integration Documents \(MRID's\)](#). Data collected during these medical tests are generally housed in the Lifetime Surveillance of Astronaut Health (LSAH) repository. These test protocols are divided into areas as shown below. Each MRID will give an indication of the type of testing performed as well as the frequency of such tests.

Click on an category image for relevant MRID information:

Behavioral Health and Performance

Bone, Muscle, Exercise

Cardiovascular

Environmental Health

Extravehicular Activity (EVA)

Immunology

Neurology

Nutrition

Radiation

Therapeutics and Clinical Care

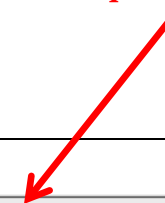
View All Medical Requirements

Note: The Medical Requirements Integration Documents (MRIDs) reflect the Medical Requirements Requirements Document (AMERD), JSC 24834, the ISS Medical Operations Requirements Document (MORD) JSC 13956.

RELATED LINKS:

Data can be requested from this repository: [+ Request Data](#)
More about [Space Medicine](#)
Catalog of Medical Hardware used on the International Space Station: [Crew HealthCare System \(CHCS\)](#)

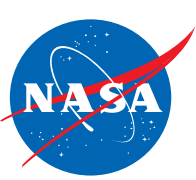
Annual medical exam &
flight-related medical
requirements



Therapeutics and Clinical Care

| Discipline | MRID# | MEDB# | Medical Requirement Title |
|--------------------------------|--------|-----------|--|
| Therapeutics and Clinical Care | MR009L | | + Pre- and Postflight Physical Exam for Long Duration Crews |
| Therapeutics and Clinical Care | MR009S | | + Pre- and Postflight Physical Exam for Short Duration Crews |
| Therapeutics and Clinical Care | MR010L | | + Clinical Laboratory Assessment for Long Duration Flights |
| Therapeutics and Clinical Care | MR010S | | + Clinical Laboratory Assessment for Shuttle |
| Therapeutics and Clinical Care | MR011L | MEDB 1.6 | + Resting ECG |
| Therapeutics and Clinical Care | MR012L | MEDB 1.9 | + Dental Examination |
| Therapeutics and Clinical Care | MR013L | | + Audiometry for ISS |
| Therapeutics and Clinical Care | MR013S | | + Audiometry for Shuttle Crews |
| Therapeutics and Clinical Care | MR014L | MEDB 1.10 | + Ophthalmology Examination |
| Therapeutics and Clinical Care | MR014S | | + Pre- and Postflight Ophthalmology Examination for Short Duration Flights |
| Therapeutics and Clinical Care | MR015L | MEDB 1.12 | + Ultrasound Imaging (Sonography) |



Other data from tests
performed for clinical
purposes may also be
available



Clinical Data: Access to LSAH Findings

- **Disseminate results of surveillance to participants, stakeholders, the research community, and the public**
 - The LSAH newsletter is published semi-annually as a communication vehicle for results gained through the surveillance process and changes to the program.
 - Surveillance results are also published in official NASA technical papers, books, and in peer-reviewed scientific journals
 - Other vehicles for communication of surveillance results are under development

National Aeronautics and Space Administration



THE LIFETIME SURVEILLANCE OF ASTRONAUT HEALTH

Newsletter

June 2010 Volume 17 • Issue 2

An Overview of the New Occupational Surveillance Program for the Astronaut Corps

BY: HEATHER J. HARTNETT, PhD

This program is designed to fit the medical follow-up care to the individual, since everyone in this population has not been exposed equally to all hazardous

The Lifetime Surveillance of Astronaut Health (LSAH) is a proactive occupational surveillance program for the astronaut corps to screen and monitor astronauts for occupational related disease. LSAH newsletters are published semi-annually with the intent to keep participants informed and up to date on the program's findings. Click on the links below to view all LSAH newsletters published to date.

| Year | Issue Date | Contents |
|------|-------------------------|--|
| 2010 | Vol-17 Issue 2 (Summer) | <ul style="list-style-type: none">• An Overview of the New Occupational Surveillance Program for the Astronaut Corps• LSAH Regulatory Participation for Astronauts• Getting More Juice from the Lemon: The Lean Process• Health and Safety Tips for Travelers |
| | Vol-17 Issue 1 (Fall) | <ul style="list-style-type: none">• Vitamin D Deficiency• The New Direction of Your Health Records• Pericardial Cancer: A Silent Killer |
| 2009 | Vol-16 Issue 2 (Spring) | <ul style="list-style-type: none">• Colorectal Cancer• Hospital Hygiene: Stopping the Spread of Nosocomial Infections• Tinnitus: Will That Ringing Ever Stop? |
| | Vol-16 Issue 1 (Fall) | <ul style="list-style-type: none">• Metabolic Syndrome: Fact or Fiction?• Multiple Plan-Vise Comparisons• Chronic Disease Surveillance |
| 2008 | Vol-15 Issue 1 (Spring) | <ul style="list-style-type: none">• Don't Stop My Heart: Heart Disease Prevention• Hazardous Air Pollutants |
| 2007 | Vol-15 Issue 2 (Fall) | <ul style="list-style-type: none">• A Brief Introduction to Bayesian Statistics• Ten Steps to Consider Before Taking Over-the-counter Medications |

NASA TP-2009-216024



Atrial Arrhythmia Summit: Summary Report

Thel E. Star, M.D., M.P.H.
Advanced Project Physician
The University of Texas Medical Branch
NASA/Johnson Space Space Center Biomedical Research Center

July 2009



RESEARCH ARTICLE

Musculoskeletal Injuries and Minor Trauma in Space: Incidence and Injury Mechanisms in U.S. Astronauts

REYNARD A. SCHROEDER, CHARLES EL MATHERS, ROBERT A. JONES, AND MARK L. WILHELM

Abstract: Astronauts sustained musculoskeletal injuries, sometimes significant, during spaceflight. These injuries were often minor trauma, such as sprains, strains, and contusions, and were typically related to the microgravity environment. The purpose of this study was to identify and describe all musculoskeletal injuries occurring throughout the U.S. space program to date, establish a baseline for injury rates, and determine the relationship between injury rates and flight time. Data were collected from 1968 to 2008. The results show that the incidence of musculoskeletal injuries was low, but that the majority of injuries were minor trauma. The results also show that the incidence of injuries was higher in the early years of the space program and that the incidence of injuries was higher in the later years of the space program. The results suggest that the incidence of injuries was related to the microgravity environment and that the incidence of injuries was higher in the early years of the space program and that the incidence of injuries was higher in the later years of the space program.

NASA Study of Cataract in Astronauts (NASCAR). Report 1: Cross-Sectional Study of the Relationship of Exposure to Space Radiation and Risk of Lens Opacity

Leo T. Chylack, Jr.,* Jeff E. Petersen, Alan H. Edwards, Mary L. Wang, F. Keith Menick, William H. Tang, Dale S. Harty, Lisa J. Munk, and Francis A. Cucinotta

*George J. Annals of the New York Academy of Sciences, Department of Medicine, Baylor College of Medicine, and The Molecular Biology Research Center, Houston, Texas; *Texas Tech University Health Sciences Center, Dallas, Texas; *NASA Johnson Space Center, Houston, Texas; *Wallops Flight Station, Wallops Island, Virginia; *NASA Johnson Space Center, Houston, Texas

INTRODUCTION

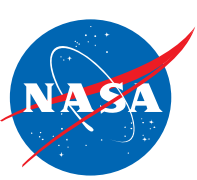
Space radiation is comprised of energetic particles and their ionizing and secondary ionizing radiation produced by shielding or losses through nuclear reactions. Risk estimation has proved a difficult problem for space medicine because of the lack of human data for these radiation types (1). Life effects such as cancer, central nervous system effects, and cataracts are the main concerns for long-term missions to the Moon or Mars and for the current International Space Station program (2). To build on data from eye examinations about the magnitude of the U.S. space program, it has been suggested that an accelerated study be conducted through NASA's study of cataract in astronauts (NASCAR) (3). Because the previous study did not use already validated methods, a new study, the NASA Study of Cataract in Astronauts (NASCAR), was begun to precisely determine the types, severity, and progression rates of lens opacification in astronauts. The present report considers the baseline or cross-sectional data collected in the study.

NASCAR is an investigation of lens opacification in populations of U.S. astronauts, military veterans, and ground-based (non-astronaut) comparison participants. The first major goal of NASCAR is a cross-sectional analysis of the opacifications that occur in the context of the various risk factors. The data were compared to data for comparison subjects and were analyzed for associations with radiation and other possible explanatory variables. The data from the cross-sectional study were collected from 2004. The second major goal is to determine the progression rates of cataracts observed in astronauts and to identify any associations

Principles of Clinical Medicine for Space Flight

MICHAEL R. BARRATT
SAM L. POOL
EDITORS

Springer



Data Request Portal for Research and Clinical Data

NASA Human Research Program (HRP)

NASA's Human Research Program (HRP) conducts research and develops technologies that allow humans to travel safely and productively in space. The Program uses evidence from data collected on astronauts, as well as other supporting studies. These data are stored in two NASA data repositories: Life Sciences Data Archive (LSDA) and Lifetime Surveillance of Astronaut Health (LSAH).

More about HRP: [HRP Home](#) | [Human Research Roadmap](#) | [Evidence Book](#) | [Progress R](#)

About Life Sciences Data Archive (LSDA)

Lifetime Surveillance of Astronaut Health (LSAH)

Search Publicly Available Information and Data [RSS](#)

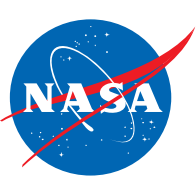
The portal provides guidance to researchers on requesting data from the LSDA and LSAH repositories

DATA REQUEST


User's Guide for Requesting NASA Data

Contents:

- [Research Data Repository \(LSDA\)](#)
- [Medical Data Repository \(LSAH\)](#)
- [Data Categories](#)
- [Requesting Human Data](#)
- [Applicable Laws and Regulations](#)
- [Requesting Animal or Plant Tissues](#)
- [Request Form](#)



Online Data Request Form



HOMERESEARCH PROJECTSMEDICAL OPERATIONS**DATA REQUESTS**JUST FOR FUNe-BOOKS

Life Sciences Data Archive @ Johnson Space Center, Houston, Texas

REQUEST DATA

Please use the form below to enter your data requests.
Please be as specific as possible and fill out the fields completely.
Acceptable alpha numeric character: a-z, A-Z, 0-9, @, \, dash, comma and dot.
Asterisks indicate required fields *.

Enter your Name: *

E-Mail: *

Phone:

Request Need Date:

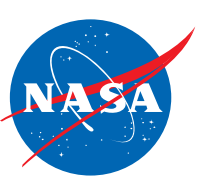
 (MM/DD/YYYY)

Mission: (if applicable)

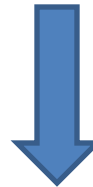
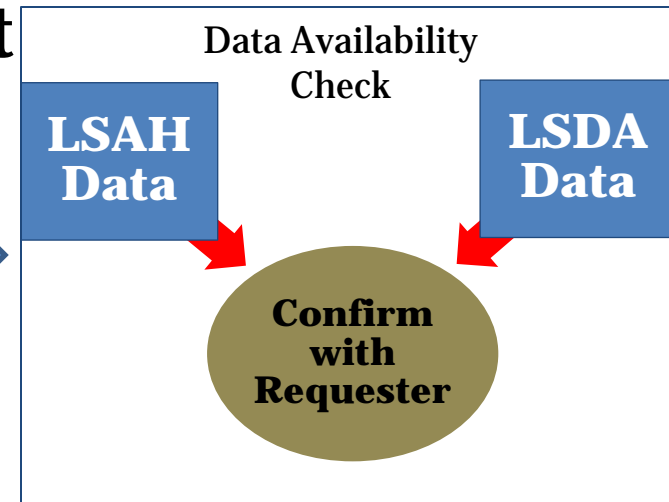
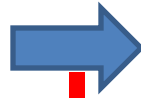
Data Type Requested: (if applicable) ☐ Tissue (LSDA) ☐ Research (LSDA) ☐ Medical (LSAH) ☐ I don't know

Grant or Contract Number: (if already in place)

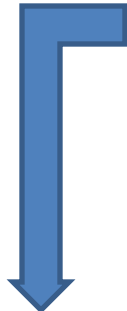
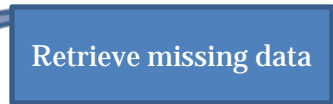
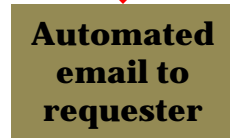
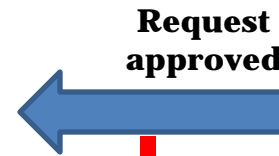
***One request form for all
repositories
(LSDA, LSAH, and Animal
Biospecimens)**

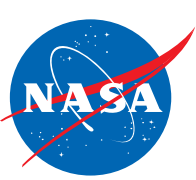


Data Request Fulfillment



**Request not
approved**





Team Approach to Fulfilling Data Requests

57 data requests completed October 1, 2010 through March 3, 2011

- **Provide data in response to Data Requests**

- Data requests from flight surgeons, NASA management, subject matter experts, and researchers will be processed and dispositioned in an integrated manner.
- Data requests will be processed jointly by LSAH and LSDA personnel to assure the requester is provided access to all available and relevant data
- LSDA and LSAH will partner with each requester to understand their needs & provide the most relevant data, whether medical , research, or a combination of both.
- Data requests in support of NRAs and RFPs

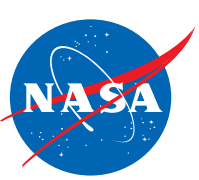
- **Sample uses of LSAH and LSDA data and information:**

- Astronaut fracture incidence rates for current flight experiment background information
- Incidence of corneal abrasion in Apollo crew due to lunar dust exposure to evaluate animal model
- Interest in ISSMP Intravenous Fluid Generation (IVGEN) study for military application
- Technical documentation on ISS treadmill and cycle ergometer vibration isolation systems
- Intraocular Pressure Data– historical LSAH/LSDA data to understand evolving issue
- Medical event data to populate a Space Medicine Exploration Medical Condition List
- Integration of Evidence Base into a Probabilistic Risk Assessment (“Integrated Medical Model”)

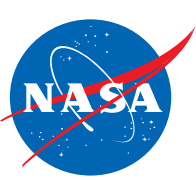


Plans for the Future

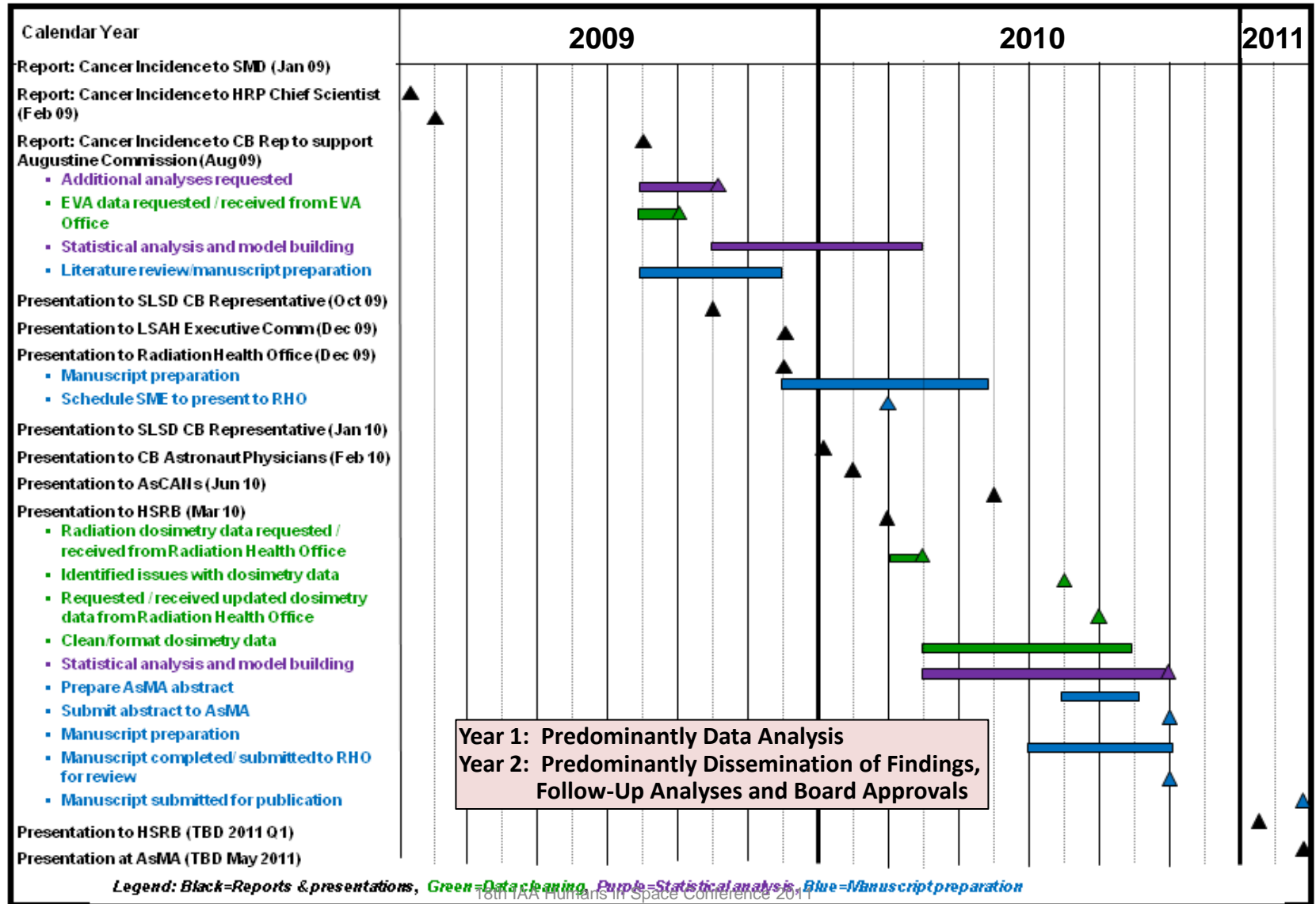
- **LSDA Content Expansion:**
 - Historical Detailed Supplemental Objectives (almost complete)
 - Historical Detailed Technical Objectives (in progress)
 - HRP Directed Research (in progress)
 - Flight Analog Extramural Studies (ongoing)
 - Future Desired Content
 - NSBRI Ground-based Studies
 - International Partner Studies
- **LSAH Occupational Surveillance Data:**
 - Develop individual exposure profiles, additional annual screening tests
 - Increased surveillance for spaceflight medical events, associated health trends
 - Conduct operational investigations (e.g., shoulder injury; intraocular pressure)
- **Early involvement in NRA and CPHS processes to facilitate data availability**
- **Consent astronauts for future uses of data**
 - LSAH: use of medical data for research purposes
 - LSDA: use of existing research data for future research studies

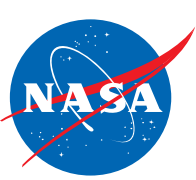


Backup Slides

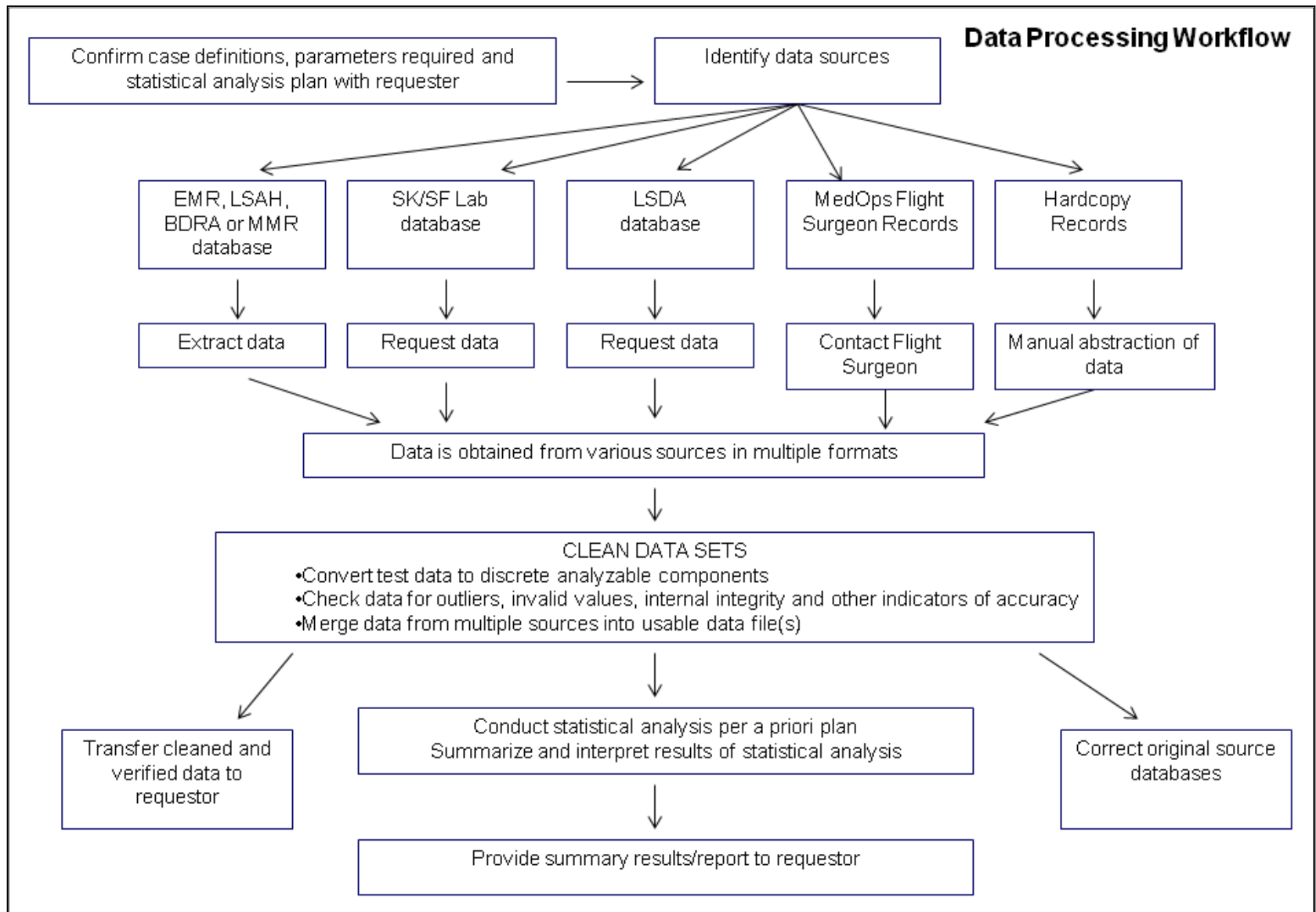


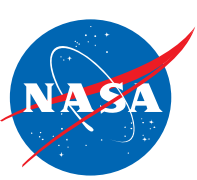
Data Analysis Timeline Example: Cancer Morbidity





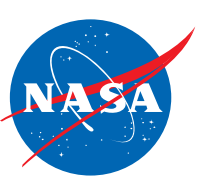
Data Processing Workflow





Abstract

- As NASA transitions from the Space Shuttle era into the next phase of space exploration, the need to ensure the capture, analysis, and application of its research and medical data is of greater urgency than at any other previous time. In this era of limited resources and challenging schedules, the Human Research Program (HRP) based at NASA's Johnson Space Center (JSC) recognizes the need to extract the greatest possible amount of information from the data already captured, as well as focus current and future research funding on addressing the HRP goal to provide human health and performance countermeasures, knowledge, technologies, and tools to enable safe, reliable, and productive human space exploration. To this end, the Science Management Office and the Medical Informatics and Health Care Systems Branch within the HRP and the Space Medicine Division have been working to make both research data and clinical data more accessible to the user community.



Abstract (continued)

- The Life Sciences Data Archive (LSDA), the research repository housing data and information regarding the physiologic effects of microgravity, and the Lifetime Surveillance of Astronaut Health (LSAH-R), the clinical repository housing astronaut data, have joined forces to achieve this goal. The task of both repositories is to acquire, preserve, and distribute data and information both within the NASA community and to the science community at large. This is accomplished via the LSDA's public website (<http://lsda.jsc.nasa.gov>), which allows access to experiment descriptions including hardware, datasets, key personnel, mission descriptions and a mechanism for researchers to request additional data, research and clinical, that is not accessible from the public website. This will result in making the work of NASA and its partners available to the wider sciences community, both domestic and international. The desired outcome is the use of these data for knowledge discovery, retrospective analysis, and planning of future research studies.